Art. X.—*New or Little-known Victorian Fossils in the National Museum.*

Part XVIII.—Some Yeringian Trilobites.

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(With Plates XIV-XVI.).

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Introduction and Summary.

Descriptions of five Victorian trilobites appeared in Part XIV. of this series[1], four of which are restricted to the Melbournian horizons. In the present paper some trilobites of the Yeringian group are dealt with, many of which have already been found in a similar fauna in New South Wales. Our knowledge of the Victorian Silurian trilobites shows that the majority of the New South Wales species are found in our upper series, or Yeringian, beds; and it seems fairly certain that the Silurian beds in the neighbouring State, are, as at Bowning and Yass, of an Upper or Newer Silurian facies. Not only do the trilobites of this upper series point to a younger phase of the Silurian, but some of the species are closely related to Lower, Middle and Upper Devonian trilobites in Bohemia and North America, such as *Goldius greenii*, sp. nov. (Lower Devonian), and *Cheirurus sternbergi*, Boeck sp. (Silurian to Upper Devonian).

On the other hand, forms like *Goldius cresswelli*, sp. nov., *Proetus euryceps*, McCoy sp., *Cyphaspis lilydalensis*, sp. nov., *C. yassensis*, Eth. fil. and Mitch. (with its *Arethusina*-like cephalon), *Calymene angustior* sp. nov., and *C. blumenbachi*, Brongn., are more or less Silurian in aspect.

Eleven species of trilobites are included in this paper:—

Goldius greenii, sp. nov.
Goldius cresswelli, sp. nov.
Proetus euryceps, McCoy sp.
Cyphaspis bowningensis, Mitchell (Also N.S.W.).

1 Proc. Roy. Soc. Victoria, vol. xxiv., pt. ii., 1912, pp. 293-300, pls. lxi.-lxiii.

Cyphaspis lilydalensis, sp. nov.
Cyphaspis yassensis, Eth. fil. and Mitch. (Also N.S.W.).
Calymene augustior, sp. nov.
Calymene cf. *blumenbachii*, Brongn. (Also Brit. Ids., continent of Europe, N. America and N.S.W.).
Cheirurus sternbergi, Boeck sp. (Also England and continent of Europe).
Phacops crossleii, Eth. fil. and Mitch. (Also N.S.W.).
Phacops serratus, Foerste. (Also N.S.W.).

DESCRIPTION OF THE FOSSILS.

TRILOBITA.—Order OPISTHOPARIA.

Fam. GOLDIIDAE, Raymond (Bronteidae, Angelin).

Genus **Goldius**, De Koninck.[1]

Goldius greenii, sp. nov. (Plate XIV., Figs. 1, 2).

Description of Holotype.—Form short, broadly ovate. Cephalon short, arcuate. Glabella unusually small at the base, expanded in front; only the middle furrow is well marked, the anterior and posterior being shallow and indistinct. Anterior margin of glabella sulcated, with a narrow and fairly deep furrow, the surface of which is ornamented by a faint undulate striation more or less parallel with the border. Neck-ring distinct. Palpebral lobes rugosely ornamented.

Thorax with ten slender segments, the distal extremities of which appear to be free; their surface relieved with fine, strongly curved or wavy transverse striae. Axal furrows of thorax practically parallel and deeply incised.

Pygidium moderately large, semi-circular; with seven radial ribs or coalesced segments, and one caudal which is bifurcated for more than half its length. Pygidial axis small, roundly angular at the distal apex; the central ridge divided by seven transverse furrows, the segments convex. Pygidial margin entire. General surface of the pygidium convex proximally, gradually becoming depressed and concave towards the posterior margin. Surface of radiating pygidial ribs ornamented by thin raised wrinklings or

1 The well-known genus-name *Bronteus* has unfortunately to give place, according to priority ruling, to De Koninck's less known name, *Goldius*. The position may be thus stated. In 1839 Goldfuss named this generic type, *Brontes*, but the name was already occupied for a genus of coleoptera by Fabricius (1801), whilst Montfort had similarly named a genus of mollusca (1810). Seeing this, Goldfuss in 1834 (cf. Barrande, Syst. Sil. Bohême, vol. i., p. 830) changed the name to *Bronteus*, but the genus had in the meantime been renamed *Goldius* by De Koninck, in 1841.

striae, which are transverse or normal in the median, bifurcated rib, but in maintaining approximately the same direction on the lateral ribs as on the median rib, the striae are disposed in an increasingly oblique manner as the thoracic region is approached. The interspaces between the pygidial ribs, and even the proximal ends of the ribs, are traversed by microscopic raised striae disposed parallel to the margin of the pygidial shield.

Dimensions.—Total length, 39.5 mm.; greatest width at thorax, 35.25 mm. Length of cephalon, including neck-ring, 11.25 mm.; length of thorax, 10.25 mm.; length of pygidium, 18 mm. Greatest width of pygidium, 30.5 mm. Width of thoracic axis, 8 mm. Width of pygidial median ridge, 2.25 mm.

Observations.—The same quarry from which the above holotype was obtained, has yielded several other, more or less imperfect examples, chiefly pygidia, which I tentatively refer to the same species. They range from the moderate-sized and neatly-ornamented flabellated pygidial specimens, to some nearly of twice the dimensions, having a slightly coarser rugose ornament. No distinction can be drawn between them. Differences of size and ornament probably represent, in some cases, sexual features.

The whole carapace in this species is remarkably short; otherwise it compares rather closely with Barrande's *Bronteus formosus*.[1] The Bohemian species, moreover, differs in its narrower frontal margin to the glabella, and the shallower and broader posterior furrow.

A related but much longer form is Hawle and Corda's *Bronteus oblongus*,[2] with similar ornament; the axial ridge of the pygidium in this species, however, is proportionally smaller. In general form, Hawle and Corda's *Bronteus berkeleyanus*,[3] from the red limestone of Mnenian, Bohemia (Ff2 of Barrande, or Lower Devonian), is almost identical. It differs in having the axis of the thorax narrower, the pygidial axis expanding terminally, and the median ridge bifurcated to one-third of its length, instead of to more than one-half as in *G. greenii*.

In reference to the Devonian aspect of a portion of our Silurian fauna, it is interesting to note that the Bohemian allied species, *G. formosus*, occurs at Dvoretz, in Lower Devonian strata, of the same group of beds as that containing *G. oblongus* above mentioned.

1 Syst. Sil. Bohême, vol. i., 1852, p. 851, pl. xlvi., fig. 14; pl. xlvii., figs. 1-5.

2 Prodrom Monogr. d. böhm. Trilobiten, 1874, p. 60. See also Barrande, Syst. Sil. Bohême, 1852, p. 853, pl. xlvii., figs. 13-17.

3 Hawle and Corda, Prod. Mon. Tril., 1847, p. 61, pl. iv,, fig. 34.

Horizon and Occurrence.—Silurian (Yeringian), Ruddock's Quarry, near Lilydale. Holotype presented by Mr. J. S. Green, after whom the species is named. Also several other fragmentary specimens from the same locality, in the Museum collection.

Goldius cresswelli, sp. nov. (Plate XIV., Fig 3; Plate XVI., Fig. 17).

Description of pygidium.—Comparatively short, one-third broader than long. Surface gently convex below the pygidial axis and falling away to a plane surface round the circumference. Pygidial axis prominent, surface covered with distinct, rounded granules, rather closely set, and extending over the whole of the flabellate portion. Pygidial fused segments six on each side of the median ray, which is simple except for a short bifurcation close to the margin. Pygidial segments fairly conspicuous around the axis, flatly rounded; slightly sinuous and concave towards the median axis; divided by a very narrow groove, which disappears near the outer margin of the pygidium.

Dimensions.—Width of pygidium, 17 mm.; length, 11 mm. Length of pygidial axis, circ. 3.5 mm.

Observations.—Although the above species is founded on a pygidium, the characters of this portion of the carapace are so well defined as to afford a good basis for its specific identification; moreover, the pygidial characters are especially distinct in this genus.

There is already one described species of the genus which bears a striking resemblance to the present form, namely, *Goldius edwardsi*, Barrande sp.[1]; found in the Silurian of Bohemia in Etage Ee2, the upper bed of the Silurian in the present interpretation of that system, and which practically agrees with the Yeringian series of the Victorian Silurian. *G. edwardsi*, although agreeing with *G. cresswelli* in form, general style of ornament, and non-bifurcation of the median axial rib, has more convexly rounded ribs in the anterior region; the median axis is more swollen; and the granulations are coarser.

Horizon and Occurrence.—Silurian (Yeringian). Cooper's Creek, Gippsland. Presented by the late Rev. A. W. Cresswell, M.A., after whom the species is named, in recognition of his valued collecting in the Silurian of this State.

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1 *Bronteus edwardsi*, Barrande, Syst. Sil. Bohême, vol. i., 1852, p. 882, pl. xlii., figs. 30-33.

Fam. Proetidae, Corda.

Genus **Proetus**, Steininger.

Proetus euryceps, McCoy sp. (Plate XIV., Fig. 4).

Forbesia euryceps, McCoy, 1876, Prod. Pal. Vict., Dec. III. p. 17. pl. XXII., figs. 10, 10*a*.

Observations.—Since McCoy's description, several specimens have come under my notice.

A finely preserved example from Ruddock's quarry near Lilydale, in the possession of Mr. J. S. Green, shows the surface of the carapace to be minutely granulated. This serves to clear up any doubt regarding the surface ornament; for McCoy remarked, in his description of the species[1]: "The surface is indistinctly preserved, but I think it is minutely granular."

A small, but nearly perfect example of the same species was found by Mr. Annear, near Lilydale, and is now in the Museum collection. It measures only 7 mm. in length. In this specimen the free cheeks and genal spines are distinctly granulate.

In a series of Silurian fossils from Loyola submitted for description by Mr. Geo. Sweet, F.G.S., there is another example of the above species. This has since been presented to the collection. The cephalon is fairly well preserved, and the rest of the carapace can be generally made out, showing the rapidly tapering axis. The granulation above referred to is well shown, especially on the glabella and anterior rings of the thorax. This example is also small, measuring only 7.5 mm. in length.

Horizon and Occurrence.—Holotype (described by McCoy) in Nat. Mus. Silurian. Broadhurst's Creek, E. of Kilmore. Bb18, Geol. Surv. Vict.[2]. Also specimens from the Silurian (Yeringian) of Ruddock's quarry, near Lilydale, coll. by Messrs. J. S. Green and R. H. Annear; and from Loyola, near Mansfield, coll. by Mr. Geo. Sweet, F.G.S.

1 Loc. supra cit., p. 17.

2 In my paper "on the Palaeontology of the Silurian of Victoria," (Rep. Austr. Assoc. Adv. Sci., Melbourne Meeting, 1913, vol. xiv.), p. 208 and lists, this locality was included in the Melbournian Series. Further considerations of the faunal assemblage of these and the allied beds at Wandong, containing *Dalmanites meridianus*, lead me to place them low down in the Yeringian, or probably representing a passage series.

Genus **Cyphaspis,** Burmeister.

Cyphaspis bowningensis, Mitchell. (Plate XIV., Fig. 5; Plate XVI., Fig. 18).

Cyphaspis bowningensis, Mitchell, 1888, Proc. Linn. Soc. N.S. Wales, vol. II., 2nd ser., pt. III., p. 418, pl. XVI., fig. 3. Etheridge, junr., and Mitchell, 1894, Ibid., vol. VIII., 2nd ser., p. 170, pl. VI., figs. 3, 3*a-h;* pl. VII., figs. 3*i-k*.

Observations.—In the Sweet collection from Loyola, near Mansfield, there are two examples of *Cyphaspis*, somewhat crushed and otherwise distorted. One of these, showing the cephalon and upper part of the thorax, is here figured. At first sight it appears to be distinct from *C. bowningensis*, on account of its large palpebral lobes, elongate glabella and depressed genal spines. A detailed examination, however, shows that all these differences are due to gentle lateral compression which the carapace has undergone; and a second specimen, still more compressed, confirms this view. As in typical specimens of *C. bowningensis*, the glabella is distinctly granulate and the pleura characteristically grooved with broad sulci.

C. bowningensis, or a closely related species, is represented in the Melbournian series by a specimen from South Yarra, consisting of a cephalon with sickle-shaped or incurved genal spines and a few anterior thoracic rings with grooved pleura. The glabella of this specimen is proportionately smaller than any figure of *C. bowningensis*, but this feature is variable amongst the known examples.

Another probable Melbournian occurrence is that of a diminutive specimen from Whittlesea, measuring only 7.5 mm. in length, as against 12 mm. in a normal specimen. It is rather more elongate in habit than usual, but has not suffered lateral compression, as in the Loyola specimen, since it occurs in a typical, undisturbed sandy mudstone. The locality of this specimen (Bb12) is described in the Geological Survey notes as "Hills in township of Whittlesea." This is probably situated on the Whittlesea anticline of Jutson,[1] the rocks on which line of strike contain Melbournian fossils, as at Yan Yean to the south.

Horizon and Occurrence.—Silurian (Yeringian). Loyola, near Mansfield. Presented by Mr. Geo. Sweet, F.G.S.

Also examples probably referable to this species from the Silurian (Melbournian) of South Yarra (coll. by Mr. F. P. Spry); and from Whittlesea (coll. Geol. Surv. Vic.).

1 Proc. Roy. Soc. Victoria, vol. xx. (n.s.), pt. i., 1908, p. 213.

Cyphaspis lilydalensis, sp. nov. (Plate XIV, Fig. 6; Plate XVI., Fig. 19).

Description.—Body suboval. Cephalon large in proportion to the rest, rapidly tapering to the pygidial extremity.

Cephalon semi-circular, anterior border rounded and deeply folded behind. Glabella of moderate size, inflated towards the back; basal lobes pyriform, more deeply incised towards the lateral glabellar sulci. Free cheeks missing. Facial sutures deeply incised in the middle, widely divergent to the anterior border, behind, sweeping outwards to cut the posterior margin near the genal angles. Glabella finely granulate.

Thoracic segments 12; axis strongly inflated, slightly wider than pleura; axal furrows deeply incised. Pleura strongly convex proximally, rapidly falling away from the fulcrum and becoming concave at the outer margins; pleura medially furrowed, ends bluntly rounded, or curving downwards to a blunt angle.

Pygidium small; axis less than one-third of the width.

Dimensions.—Total length of specimen (imperfect), 9 mm. Approximate length when complete, 10.75 mm. Greatest width of thorax, 6.5 mm. Greatest width of axis, 2.5 mm. Greatest width of pleura, 2.25 mm. Length of cephalon, including neck-ring, 3.6 mm. Length of glabella measured from neck-furrow, 2 mm.; width, 2 mm.

Relationships.—This trilobite belongs to the *C. burmeisteri* type described by Barrande[1], from the Ordovician and Silurian of Bohemia. The axis in that species, however, is slenderer, and the glabella longer, whilst the posterior extremity is not so tapering. *C. bowningensis*, Mitchell,[2] somewhat resembles *C. lilydalensis*, differing in the longer and larger glabella, the narrower axis and the broader posterior extremity.

The British species, *C. megalops*, McCoy sp.,[3] is perhaps most closely related to *C. lilydalensis*, the chief points of difference in the latter being the more oval outline of the body, absence of a thoracic spine (although this may have become detached before fossilisation), and the neater or smaller cranidial characters, as the glabella together with the basal lobes. It may, therefore, be reasonably regarded as a southern variant of the British form.

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1 Syst. Sil. Bohéme, vol. i., 1852, p. 484, pl. viii., figs. 61-71.

2 Proc. Linn. Soc. N.S. Wales, vol. ii., 2nd ser., pt. iii., 1888, p. 418, pl. xvi., fig. 3. Etheridge jnr. and Mitchell; ibid., vol. viii., 2nd ser., 1894, p. 170, pl. vi., figs. 3, 3*a-h*; pl. vii., figs. 3 *i-k*.

3 ? *Harpes megalops*, McCoy, Syn. Sil. Foss. Ireland, 1846, pl. iv., fig. 5.
Salter. Mem. Geol. Surv. Un. Kingd., dec. vii., 1853, pl. v.

C. bowningensis, above mentioned, is also clearly related to *C. megalops* in possessing a thoracic spine, but differing in many details, such as the longer glabella and more depressed carapace.

In its tapering extremity, *C. lilydalensis* resembles the Lower Helderbergian species, *C. coelebs*, Hall and Clarke;[1] a form remarkable for its very long genal spines.

Horizon and Occurrence.—Silurian (Yeringian). Wilson's quarry, near Lilydale. Coll. by Mr. R. H. Annear.

Cyphaspis yassensis, Etheridge fil. and Mitchell. (Plate XIV., Fig. 7; Plate XVI., Figs. 20, 21).

Cyphaspis yassensis, Etheridge fil. and Mitchell, 1894. Proc. Linn. Soc. N.S. Wales, vol. VIII. 2nd ser., p. 172, pl. VI., figs. 1, 1*a-d*.

Observations.—The Victorian specimens agree in all particulars with those described from the Lower Trilobite bed of the Bowning series between Bowning and Yass, N.S. Wales. Their occurrence in these Yeringian beds seems to point to the view that the whole of the Bowning series may be stratigraphically not lower than the Newer Silurian of Victoria.

As remarked by Messrs. Etheridge and Mitchell, the large size of the pygidium in this species points to a relationship with *Proetus*. The Victorian specimens show the same peculiar, supposed auditory organs first noticed in this genus by those authors.

Horizon and Occurrence.—Silurian (Yeringian). In yellow, micaceous mudstone (topmost bed), Wombat Creek, a tributary of the Mitta Mitta River, N.E. Gippsland. The remains are fairly common. Coll. Geol. Surv. Vict. (W. H. Ferguson).

Also a pygidium probably referable to this species from the junction of the Woori Yallock and Yarra; Geol. Surv. Vict. (B23).

Portion of a cranidium (associated with *Orthis testudinaria*): Glenburnie Road, Whittlesea. Presented by Mr. J. T. Jutson.

Fam. Calymenidae, Milne Edwards.

Genus Calymene, Brongniart.

Calymene angustior, sp. nov. (Plate XV., Figs. 8-10).

Description.—Body, long ovate.

Cephalon semi-circular, more than one-third the total length. The glabella comparatively narrow and high, and the width less

[1] Pal. N. York, vol. vii., 1888, p. 151, pl. xxiv., fig. i.

than that of the free cheeks and nearly equal throughout. Side lobes three, the posterior moderately large, the median small and the anterior hardly developed. Frontal lobe prominent; the anterior limb quadrate and deeply furrowed behind. Neck furrow deep, and continued to the slightly rounded genal angles. Free cheeks gibbous, usually not so inflated as the glabella. Eyes situated on the elevated portion of the free cheeks and slightly anterior to the middle lobe of the glabella. Furrows between glabella and free cheeks deep. Neck ring thick in middle, thinning out laterally.

Thorax.—The body axis is of about the same width as the pleura, and at the sides invariably thickened into tubercles. Axis rings deeply furrowed. Fulcra of pleura situated about half-way to the lateral border; ends posteriorly rounded and bent forward. Pleura deeply ridged.

Pygidium almost semi-circular, strongly convex. The axis is deeply incised at the junction with the lateral ribs. Axial rings gently arched. The prominent lateral ribs are medially furrowed half-way to the margin. Surface of carapace finely tuberculate, apparently with granules of one size.

Dimensions.—Total length of holotype, 54 mm.; made up as follows:—Cephalon, 17.5 mm.; thorax, 25 mm.; pygidium, 11.5 mm. (these measurements are approximate, especially for the thorax, which has undergone compression and recurvation); width of cephalon between genal angles, 39 mm.

Relationships.—This species show relationship to two British forms, *C. tuberculosa*, Dalman,[1] and *C. blumenbachii*, Brongniart,[2] as well as to a North America species, *C. niagarensis*.[3] The narrow, elongated glabella and the deep and extended neck furrow separate the Victorian species from *C. tuberculosa*, the glabella in that form being short and anteriorly tapering. The lateral riblets of the pygidium in *C. angustior* are furrowed or bifurcated distally, but in *C. tuberculosa* they are simple. In both species the lateral ends of the axial rings of the thorax are tuberculate.

In the latter feature, *C. niagarensis* is related to the Victorian,

1 *C. blumenbachii*, var. a, *tuberculosa*, Dalman, Ueber die Paläaden oder die sogenannten Trilobiten, a. d. Schwedischen übersetzt von Fr. Engelhard, 1828.

C. tuberculosa, Dalman, Salter, Mem. Geol. Surv. Gt. Brit., vol. ii., pt. i., 1848, p. 342, pl. xii.

2 *C. blumenbachii*, Brongniart, Crust. foss., vol. ii., pt. i., 1822, pl. i., fig. 1A-C. Barrande, Syst Sil. Bohême, vol. i., 1852, p. 566, pl. xix., fig. 10; pl. xliii., figs. 46-48. Brit. Trilob. (Pal. Soc. Mon.), pt. ii., 1865, p. 93, pl. viii., figs. 7-16; pl. ix., figs. 1, 2.

3 *C. niagarensis*, J. Hall. Geol. N. York, pt. 4, 1843, p. 102, fig. 3. Weller, Bull. Chicago Acad. Sci., No. iv., pt. ii., 1907, p. 261, pl. xxiii., figs. 9, 10.

and it also has a narrow glabella; the body, however, is not so elongate as in *C. angustior*, and it is a typically smaller form.

C. blumenbachi has a wider and more evenly convex gabella, and the neck furrow is, as a rule, not so strongly marked. Moreover, the rings of the axis are not conspicuously tuberculate, as in *C. tuberculosa*, *C. angustior* and *C. niagarensis*. The granulose surface agrees with that of *C. tuberculosa* rather than with *C. blumenbachi*.

Horizon and Occurrence.—Silurian (Yeringian). Holotype and paratype from Ruddock's quarry, near Lilydale; in olive brown mudstone.[1] Presented by Mr. J. S. Green.

Silurian (probably Yeringian). Range on E. side of commonage, Kilmore; Coll. Geol. Surv. Vict. (Bb 23.)—A nearly complete cephalon in reddish coloured sandstone. Also Kilmore Creek, north of the special survey. Coll. Geol. Surv. Vict. (Bb 20).—A cephalon in indurated mudstone.

Calymene cf. *blumenbachi*, Brongniart.[2] (Plate XV., Fig. 11).

Remarks.—A cephalon, tentatively referred to the above species, is found in the Victorian Yeringian series. It is characteristed by its broad and strongly convex glabella, and in this respect quite unlike the previously described *C. angustior*. The anterior limb bordering the glabella is deeply furrowed behind, and its horizontal margin gives a subquadrate aspect to the cephalon. The lateral tubercules are even larger than *C. angustior*.

To the above species I have also referred a well-preserved specimen from the Melbournian of Moonee Ponds Creek, Flemington. This consists of thorax and pygidium, in which the width of the carapace exceeds that of the Yeringian species, *C. angustior*.

C. blumenbachi also appears to occur in New South Wales, in the Hume beds of the Bowning district, if I am correct in referring to that species the form figured by C. Jenkins[3] under the name of *Calymene duplicata*, Murchison.

Horizon and Occurrence.—Silurian (Yeringian). Yellow, sandy mudstone; sect. 12, parish of Yering, Geol. Surv. Vict.

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1 Attached to the same slab as the holotype is a cast of *Nucula opima*, J. Hall, var. *australis*, Chapm., a variety already described from both the Melbournian and Yeringian facies of the Victorian Silurian (Mem. Nat. Mus. Melbourne, No. 2, 1908, p. 31, pl. iii., figs. 39-43).

2 For references see antea.

3 Proc. Linn. Soc. N.S. Wales, vol. iii., 1879, p. 27, pl. vi., fig. 4.

Fam. Cheiruridae, Salter.

Genus **Cheirurus**, Beyrich.

Cheirurus sternbergi, Boeck sp. (Plate XV., Figs. 12, 13; Plate XVI., Fig. 22).

Trilobites sternbergi, Boeck, 1827, Not. til laeren, Trilob., Mag. for Naturvid., vol. VIII., p. 37. Burmeister, 1843, Organ. d. Trilob., p. 132, pl. III., figs. 7, 8.

Cheirurus sternbergi, Beyrich, 1845, Ueber böhm. Tril., p. 15, fig. 4. Hawle and Corda, 1847, Prod. Monogr. d. böhm. Trilobiten, p. 135. Barrande, 1852, Syst. Sil. Bohême, vol. I., p. 795, pl. XLI., figs. 29-39.

Description.—A rather undersized, but fairly complete specimen found near Lilydale shows the cephalon and seven thoracic segments; the remainder with the pygidium having split off the rock, a brittle mudstone, during extraction. The whole of the cephalon has a granulate surface. The thoracic body rings are well marked and the distal ends of the pleura are free, and curved downwards to a greater degree than are shown in Barrande's fig. 31 on Pl. XLI. (loc. supra cit.). This specimen probably measured when complete about 16 mm. in length. The width of the cephalon is 10 mm.

The cephalon of a larger example, coll. by Mr. J. S. Green, from Seville, measures 30 mm. in width and 21 mm. in length. The greatest width of the glabella, in front of the anterior furrow, is 16 mm.

Observations.—Several cranidia of a *Cheirurus* have been found at various times in the Victorian Yeringian beds in the neighbourhood of Lilydale and Seville. The shape of the anterior part of the glabella in these specimens and the character of the anterior and median furrows in cutting transversely across the central area, together with the inclined posterior furrow, which makes an X-shaped figure with the neck furrow, shows it to belong to the above species.

The only other species comparable with the Victorian appears to be *C. gibbus*, Beyrich.[1] This species, however, has a narrower body, a more inflated glabella, straighter anterior and median furrows, and a less salient anterior angle to the middle of the neck ring.

1 Ueber böhm. Trilob., 1845, p. 16, fig. 5. Also Barrande, Syst. Sil. Bohême, vol. i., 1852, p. 792, pl. xl., figs. 35-39; pl. xli., figs. 17-27; pl. xlii., figs. 12-15.

The Rev. G. F. Whidborne has described from the Middle Devonian of Lummaton, Devonshire, England, a species named *C. pengellii*,[1] which appears to be midway between *C. sternbergi* and *C. gibbus*. The glabella is not so broad as in the Victorian specimens, and the posterior lateral wings of the fixed cheeks not so extended.

The Victorian specimens show the fixed cheeks to be finally granulated, as in typical specimens of *C. sternbergi*.

The stratigraphical distribution of the three species above referred to affords an interesting comparison with regard to the Victorian occurrence. *C. gibbus* and *C. pengellii* are both found in the Devonian alone, whilst *C. sternbergi*, with which the Victorian specimens are identified, has a range extending from the Silurian to the Upper Devonian (Etages E-H).

Horizon and Occurrence.—Silurian (Yeringian). In mudstone, Ruddock's quarry, near Lilydale. Presented by Mr. J. S. Green.

In dark grey limestone, Wandin Yallock, near Seville, coll. by F. Chapman. Also a wax squeeze from a specimen in Mr. J. S. Green's collection, from the same locality.

Fam. Phacopidae.

Genus **Phacops**, Emmrich.

Phacops crossleii, Etheridge fil. and Mitchell. (Plate XV., Figs. 14, 15).

Phacops crossleii, Etheridge, jnr., and Mitchell, 1896, Proc. Linn. Soc. N.S. Wales, vol. X., 2nd ser., p. 489, pl. XXXIX., figs. 9-11.

Observations.—This species has been described by the above authors from the Upper Trilobite bed of Bowning, near Yass, N.S. Wales. In Victoria it has been met with in the Yeringian synclinal fold of the Lilydale district, and it thus agrees in stratigraphical position with its occurrence in New South Wales.

The specimen here figured from the Lilydale district is almost perfect (fig. 14). It measures about 41 mm. in length, and equal to that of Etheridge and Mitchell's type from Bowning, judging from the figures of the thorax and pygidium given by those authors. One of the eyes is well preserved, and the vertical rows of lenses number about 21; the New South Wales specimens average about 17.

1 The Devonian Fauna of the S. of England, pt. i. (Mon. Pal. Soc.), vol. xlii., 1889, p. 8, pl. i. s. 10-12, 13, 15.

Another locality in Victoria for *P. crossleii* is on a branch of the Saltwater River, one mile west of Gisborne. It is interesting to note that the rock in which this specimen occurs bears a strong resemblance to the Keilor graptolite-bearing mudstones, the latter series showing relationships in regard to the trilobitic and graptolitic contents, to the Newer Silurian series.[1] This specimen, except for a certain amount of crushing, is fairly complete, and its essential characters are easily seen; it occurs in olive grey mudstone. The only other trilobite with which it could be compared is *P. serratus*, Foerste, which also is a Yeringian form in Victoria.

In the museum collection there is a fine specimen of *P. crossleii*, from Kinglake West, measuring 44 mm. in length. The rock in which this occurs is a black indurated mudstone, and contains several Yeringian fossils, among which are *Pleurodictyum megastomum* and *Dalmanites meridianus*. The granulate thorax and absence of dorsal spines place it with the species *P. crossleii*.

Horizon and Occurrence.—Silurian (Yeringian). Ruddock's quarry, near Lilydale; collected by Mr. R. H. Annear.

Also from Kinglake West; presented by Mr. Allan M. Savage.

Also Silurian (probably Yeringian), from a branch of the Saltwater River, one mile west of Gisborne; coll. by Geol. Surv. Vict.

Phacops serratus, Foerste. (Plate XV., Fig. 16).

Phacops serratus, Foerste, 1888, Bull. Sci. Lab. Denison Univ., vol. III., p. 126, pl. XIII., fig. 1. Etheridge, jnr., and Mitchell, 1896, Proc. Linn. Soc. N.S. Wales, vol. X., 2nd ser., p. 495, pl. XXXIX., figs. 7, 8; pl. XL., figs. 7, 8, 11.

Observations.—Etheridge and Mitchell point out the rather close relationship which this species bears to *P. crossleii*. I have found the Victorian examples of *P. serratus* considerably smaller than *P. crossleii*, and this, with its feebler granulation on the thorax and the development of the spiny or angular axis, serve to show that there is a distinction, which, as Etheridge and Mitchell observe, may be only a sexual one.

The larger of the two Victorian specimens of *P. serratus* has a length of 21 mm.

Horizon and Occurrence.—Silurian (Yeringian). One and a-half miles below Simmond's Bridge Hut, on the Yarra. Coll. Geol. Surv. Vict. (B16).

1 See Chapman, Pal. Sil. Vict. Rep. Austr. Assoc. Adv. Sci., Melbourne meeting, 1913, p. 210, and lists of fossils.

EXPLANATION OF PLATES.

Plate XIV.

Fig. 1.—*Goldius greenii*, sp. nov. Holotype. Silurian (Yeringian). Ruddock's quarry, near Lilydale. Pres. J. S. Green.

,, 2.—*G. greenii*, sp. nov. Paratype; pygidium of a larger example. From the same locality. Pres. by J. S. Green.

,, 3.—*Goldius cresswelli*, sp. nov. Holotype; pygidium. Silurian (Yeringian). Cooper's Creek, Gippsland. Pres. Rev. A. W. Cresswell, M.A. (See also fig. 17.)

,, 4.—*Proetus euryceps*, McCoy sp. Silurian (Yeringian). Ruddock's quarry, near Lilydale. Coll. R. H. Annear.

,, 5. *Cyphaspis bowningensis*, Mitchell. Silurian (Yeringian) Loyola, near Mansfield. Pres. G. Sweet, F.G.S. (See also fig. 18.)

,, 6.—*Cyphaspis lilydalensis*, sp. nov. Holotype. Silurian (Yeringian). Wilson's quarry, near Lilydale. Coll. R. H. Annear. (See also fig. 19.)

,, 7.—*Cyphaspis yassensis*, Etheridge fil. and Mitchell. Silurian (Yeringian). Wombat Creek, N.E. Gippsland. Coll. Geol. Surv. Vict. (See also fig. 20.)

All figures on this plate about natural size.

Plate XV.

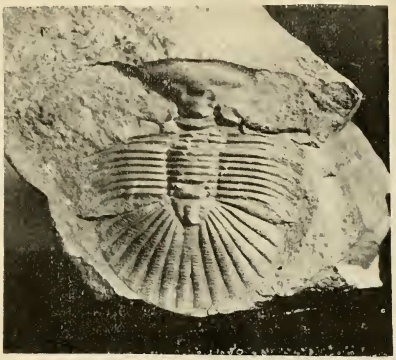
Fig. 8.—*Calymene angustior*, sp. nov. Holotype. Silurian (Yeringian). Ruddock's quarry, near Lilydale. Pres. J. S. Green.

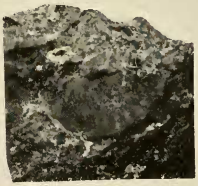
,, 9.—*C. angustior*, sp. nov. Paratype. Same locality. Coll. J. S. Green.

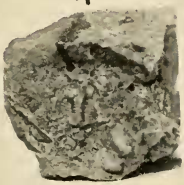
,, 10.—*C. angustior*, sp. nov. Silurian (probably Yeringian). Kilmore Creek, north of the special survey. Coll. Geol. Surv. Vict. Bb 20.

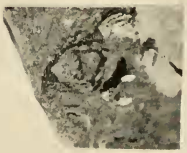
,, 11.—*Calymene* cf. *blumenbachi*, Brongniart. Silurian (Yeringian). Parish of Yering. Geol. Surv. Vict. coll. 1862.

,, 12.—*Cheirurus sternbergi*, Boeck sp. A wax squeeze from a mould in limestone. Silurian (Yeringian). Wandin Yallock, near Seville. Coll. J. S. Green.









F.C., Photo.

Yeringian Trilobites.